

Assistive Technology in Indiana Schools

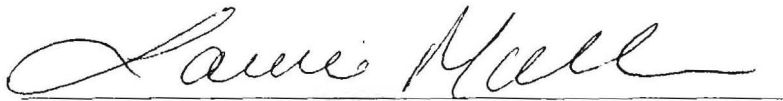
An Honors Thesis (HONRS 499)

by

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Thesis Advisor

Dr. Laurie Mullen

A handwritten signature in cursive script, reading "Laurie Mullen", written in black ink on a white background. The signature is fluid and elegant, with a long horizontal flourish extending to the right.

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## Abstract

Ever since I was young, I loved learning. For the past four years, I have had the opportunity to continue learning and studying to become a special education teacher. In addition, I have been fascinated by technology and believe it is important to stay up-to-date with the current trends. Therefore, I wanted my honors thesis to incorporate education and technology. I decided to focus on assistive technology and how it is used in Indiana schools.

The purpose of my honors thesis was to learn more about assistive technology (AT) and then to share that knowledge with others. There were several components to my thesis. Through reading articles from the Internet and books and by taking a technology class (SPCED 331) at Ball State University, my understanding about assistive technology greatly increased. I also surveyed some Indiana public high school teachers about their knowledge and use of AT. During the fall semester of 2011, I gave two presentations about assistive technology and the survey results at club meetings on campus. In addition, I invited Daniel McNulty, associate director of professional development and northeast regional coordinator for Promoting Achievement through Technology and Instruction for all Students (PATINS) Project, to give a presentation at Ball State University. To sum up all that I have learned and completed, I created podcasts so others can continue to learn about AT.

### Acknowledgements

I would like to thank Dr. Laurie Mullen for agreeing to be my advisor during this project. She was an invaluable resource and provided me with much guidance and support. Thank you so very much Dr. Mullen!

I would like to thank Daniel McNulty for coming to Ball State University and giving a presentation about “Accessible Instructional Material in the Classroom: A Practical Approach.”

I would like to thank Tiffany and Allison for their encouragement throughout the past year as I have worked on this project. Thanks 305!

### Author's Statement

According to the Individuals with Disabilities Education (IDEA) Act of 2004, assistive technology (AT) is defined as devices and services, such as visual aids, communication tools, and specialized equipment for accessing a computer, that are used to increase, maintain, or improve the functional capabilities of children with disabilities, allowing them to benefit from special education and promoting their independence. Examples include computer software programs, communication devices, and organizational tools. An assistive technology consideration is required for every child that has an individualized education program (IEP). For some students, assistive technology can be a necessary part of their daily activities. AT enables individuals to communicate, learn, play, and be independent. It can also be helpful to many individuals, not just those with disabilities.

I began my honors thesis by researching assistive technology. I used textbooks and Internet resources to learn about its history, laws, and impact on individuals. In addition, during the spring of 2011, I took a class at Ball State University that specifically focused on assistive technology. The class, SPCE 331, provided me with a hands-on opportunity to learn about various assistive technology tools and how to use them. I also visited Carlos Taylor in the Adaptive Computer Lab in the Robert Bell building, room 134G. He showed me many of the assistive technologies that are available for students who are blind, have visual impairments, or have learning disabilities. In addition I attended a webinar provided by PATINS and the Indiana Department of Education to learn from educators across the state and how they use AT. Finally, I took part in a Skype session, hosted by Daniel McNulty, at Northside Middle School with other teachers.

During the spring of 2011 and after researching AT, I had a meeting with Anna Epperly, Special Education Program Supervisor at Wilson Middle School in Muncie, Indiana, and learned what AT devices were offered at her school. Those devices included Alpha Smart 2000 (word processors), Kurzweil (optical character recognition and scanning program), FM systems, and smart boards. I learned that funding was a major issue in the schools and many people did not understand exactly where the money would come from to buy new devices.

After meeting with Mrs. Epperly, I was interested in seeing how other schools across the state were incorporating assistive technology. I decided to create a survey to assess teachers' knowledge and use of AT. I completed the required Collaborative Institutional Training Initiative (CITI) and then developed a proposal for the Institutional Review Board (IRB). After being granted permission from the IRB to continue, I created the ten question survey through SurveyMonkey.com. Six public high schools throughout Indiana were selected and the survey was sent to the principals at those schools to forward to their staff. The participants were given three weeks to complete the survey, and then the results were analyzed. The results were quite interesting, as many of the participants did not know much about assistive technology. I also learned what (if any) assistive technology devices were used in the schools.

During the fall of 2011, I compiled what I had learned about assistive technology from my research and the survey and had the opportunity to give two presentations. The first presentation was for the Student Council of Exception Children (SCEC). The members of SCEC

are primarily special education majors and/or are interested in working with individuals with disabilities. My focus for this presentation was explaining assistive technology and its importance and providing resources for the members. The second presentation was for Education in Action (EIA). Those involved in EIA are elementary education majors therefore I gave a basic overview of AT, and discussed ways they could use it in their classroom. Both presentations were successful and well received.

In addition, to the presentations I gave I also invited Daniel McNulty to give a presentation on campus. Mr. McNulty is the associate director of professional development and northeast regional coordinator for Promoting Achievement through Technology and Instruction for all Students (PATINS) Project. He came on November 17, 2011 and gave an hour long presentation about accessible instructional material (AIM) in the classroom. The presentation had been advertised the month prior through flyers, emails, and television announcements. In the end, there was a great turnout with about fifty students and staff attending the presentation.

To sum up my thesis and all that I had accomplished, I decided to create podcasts. I created three podcasts so that others could continue to learn about assistive technology. The first podcast focused on a general overview of assistive technology. The second podcast was about the AT selection process and examples of AT. The final podcasts discussed the resources and mentioned Daniel McNulty, PATINS, and AIM. These podcasts can be found on the website <http://emanderson3.iweb.bsu.edu>.

My honors thesis has taught me much about my future career, life, and self. I have learned how to do a comprehensive research study and collaborate with others. This was especially important for me to learn because I will use those skills in the workplace. I know how to find information from a variety of sources, the process of surveying individuals, and the support network that can be formed when I reach out to others. In addition, I learned so much from the numerous people who helped me along the way, including how to do advertisements, network, and find additional resources. I have learned how to give presentations that are geared toward a specific audience as well as host a presentation. I was surprised that it took half a year to plan a one hour presentation! I learned how to manage my time and ask others for help when needed. My honors thesis has provided me with invaluable resources that I will continue to use throughout my teaching career and life.



## Institutional Review Board

DATE: September 26, 2011  
TO: Elizabeth Anderson  
FROM: Ball State University IRB  
RE: IRB protocol # 271195-1  
TITLE: Assistive Technology in Indiana Schools  
SUBMISSION TYPE: New Project  
ACTION: DETERMINATION OF EXEMPT STATUS  
DECISION DATE: September 26, 2011

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The Institutional Review Board reviewed your protocol on September 26, 2011 and has determined the procedures you have proposed are appropriate for exemption under the federal regulations. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record.

### Editorial notes:

#### 1. Approved- Exempt Status (Category 2)

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. **Any procedural modifications must be evaluated by the IRB before being implemented, as some modifications may change the review status of this project.** Please contact please contact John Mulcahy at (765) 285-5106 or [jmulcahy@bsu.edu](mailto:jmulcahy@bsu.edu) if you are unsure whether your proposed modification requires review or have any questions. Proposed modifications should be addressed in writing and submitted electronically to the IRB (<http://www.bsu.edu/irb>) for review. Please reference the above IRB protocol number in any communication to the IRB regarding this project.

**Reminder:** Even though your study is exempt from the relevant federal regulations of the Common Rule (45 CFR 46, subpart A), you and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.

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Assistive Technology in Indiana Schools

Elizabeth Anderson

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### Abstract

This paper describes assistive technology (AT). A brief history and timeline of the laws passed relating to AT are included as well as benefits, its importance, and implementation considerations. The paper centers around the academic use of AT and discusses some of the common academic difficulties students face as well as AT solutions. Examples of AT currently used in public schools in Indiana as well as Ball State University are mentioned. Finally, this paper examines the results of a survey completed about AT use in secondary public schools throughout Indiana.

### Assistive Technology in Indiana Schools

For some individuals, assistive technology (AT) can be life changing. It can help them achieve success in the classroom, workplace, and daily life activities. For example, there was an eight-year-old boy named Eli who lacked decoding skills and could not write much. He loved to be in control; however, his specific learning disability and academic difficulties were frustrating him. When an interactive phonics program and other software were added to his curriculum, his literacy skills greatly improved. He was able to show his competency and “the positive attention and feedback from peers has significantly increased Eli’s self-esteem and made him more willing to try new, challenging tasks” (Wellington, 1998, p.1).

According to the Technology Related Assistance for Individuals with Disabilities Act of 1988, assistive technology is defined as: “Any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities” (Kids Together, Inc., 2009, p.1).

One of the first pieces of assistive technology was the manual typewriter. In 1808, Pellegrino Turri built one for a friend who could not write because of a vision impairment. For others who had physical disabilities and could not speak, a typewriter was a very important device. (Dell, 2008, p.10). In 1980, spell check (WordPerfect) came to the rescue of struggling spellers and typists. The year 1988 was a monumental year for AT as the first piece of legislation impacting AT, the Technology Related Assistance for Individuals with Disabilities Act of 1988, was passed. The act defined assistive technology and “provided states with funding to develop comprehensive programs to meet the assistive technology needs of individuals with disabilities” (Hart, 2009, p.58). It mandated that technology is needed for some individuals because it helps

them to complete daily tasks. Using technology to communicate is just one example of how “technology is a necessity for some individuals with disabilities because it enables them to engage in life’s tasks” (Hart, 2009, p.58). Before 1988, AT was addressed, but never obligatory. Congress passed this act to “improve the availability of, and funding for assistive technology; expanding the knowledge of well-organized applications of assistive technology devices and services; and promoting collaboration among state agencies” (Hart, 2009, p.58)

In 1997, the Individuals with Disabilities Education Act (IDEA) was reauthorized clearly defining AT and adopting the Tech Act definition. It also required consideration of AT needs for all students in special education. The Assistive Technology Act (ATA) of 1998, “affirmed that technology is a valuable tool that can be used to enhance the lives of individuals with disabilities” (Hart, 2009, p.58). This act had the intention of supporting states and extending funding to develop more thorough state-wide programs for technology-related assistance.

In 2004, the Individuals with Disabilities Education Act of 2004 redefined AT as:

Devices and services, such as visual aids, communication tools, and specialized equipment for accessing a computer, that are used to increase, maintain, or improve the functional capabilities of children with disabilities, allowing them to benefit from special education and promoting their independence. (Hart, 2009, p.58).

Also, IDEA 2004 put in the exclusion clause stating that “the term assistive technology device does not include a medical device that is surgically implanted, or the replacement of such device” (Dell, 2008, p. 5). Examples include feeding tubes and cochlear implants. After IDEA 2004, AT became a required consideration on every student’s individualized education program (IEP), focusing on a student’s access to the general education curriculum.

Currently with the New Teaching Professional Standards, there is an emphasis on consideration for universal design for learning (UDL). UDL strives to make curriculum accessible to the most students possible. “AT is often built into educational materials and can be

customized to help students with disabilities be successful with the general education curriculum” (Raskind, 2010, p.1). An example of UDL includes digital media. AT can be categorized based on its function. There are seven categories: communication aids, computer access aids, daily living, environmental, hearing and listening, mobility and transformation, and vision and reading. Though AT can be used in many areas of one’s life, the focus will be primarily on academics.

AT is listed on a continuum spanning low technology to mid and high technology. Low technology includes devices that have no electronic components and are relatively inexpensive. Examples include pencil grips, calculators, graphic organizers, clipboards, highlighters, sticky notes, different colored pens, and stamps. Mid technology devices are electronic, less expensive, and require less training than high technology devices. High technology devices are based on computer technology, sometimes complicated to operate, expensive, and require more training to use. An example is a computer. (Dell, 2008, p. 5-6).

There can be many benefits to AT. According to Kids Together, Inc., “Assistive technologies enable people to communicate, receive instruction, learn, play, move about, achieve, and be independent” (Kids Together, Inc., 2009, p.1). AT helps students become less reliant on teachers or other individuals and more independent. It is often referred to as the “great equalizer” because it helps an individual complete tasks and show understanding that may not otherwise be possible. (Hart, 2009, p.59). AT helps enable individuals to perform competitively in the workplace as well. Individuals using AT are provided access to more experiences. Another benefit to AT is that it can be adapted to meet the individual’s evolving needs. Technology is motivating and many students respond well to it. Simple technology can change a person’s life and allow him or her to complete work in the best individualized way.

One must also keep in mind that technology alone is not enough (Dell, 2008). Individuals must have instruction, training, practice, and support to understand how to use the AT correctly and efficiently. AT considerations usually take place during a student's case conference when the IEP is discussed. The committee members including the parents, teachers, and administrators discuss what would be best for the student. Their goal, if AT is selected, is to match the AT device and/or service with each individual student's strengths. The student should feel comfortable with the technology tools. Questions to be asked during the meeting include: What are the child's specific needs and challenges? What are the child's strengths? What are the child's interest skill and experience in using technology? In what setting will the student use the AT tool? (Raskind, 2010, p.3). Consulting with professionals who have evaluated the student and know more details about the AT products is recommended also. In addition, AT will only succeed if paired with good teaching strategies. Teachers should model and explicitly teach how to use the AT device and provide time and opportunities for the student to practice with it before independently using it. Not every product will be useful and what is useful for one student may not work for another; it is important to make decisions on a case by case basis. Even the most well designed technology can only accommodate the disability; it will not erase it. (Raskind, 2010)

In terms of writing, there are a few common difficulties students with learning disabilities (LD) or attention deficit disorder (ADD) may encounter. Writing may be overwhelming or the students may not know or understand the steps in the writing process. Spelling can be a challenge, as well as the mechanics of writing. Some students may write slowly, have poor note taking skills, or cannot use a pencil. When students have a low literacy level, writing is often a struggle. In addition, students with poor fine motor coordination or dysgraphia may have

illegible handwriting, thus AT would be a good choice for them. (National Council for Learning Disabilities, 2006).

There are several low technology AT devices that students could use with writing. These examples include pencil grips, clipboards, paper on slanted boards, paper with raised/bold lines, signature guides, stamps, and graphic organizers. Programs such as Inspiration™ and Kidspiration™ provide templates for students to use when writing drafts that match the specific organizing task. They are visual ways to explore and understand words, numbers, and concepts by combining text, numbers, and spoken words to develop vocabulary, word recognition, reading comprehension, and critical thinking skills. (Dell, 2008, p.28) Other beneficial software programs include word processing software (Microsoft Word™), word prediction software (Word Q™ and Co: Writer™), and speech recognition software (Dragon Naturally Speaking™ and Speak Q™). (Dell, 2008, p.49).

In addition to writing difficulties, students may find reading challenging. Students may have problems with decoding and reading comprehension, especially inferential questions and critical thinking. Other areas of concern include phonics, limited vocabulary, and slow reading.

AT devices that assist with reading difficulties include Ghost Reader™ and IntelReader™, both of which are text to speech programs. Reading Pen™ helps students with dyslexia or English as a Second Language (ESL) students by reading aloud scanned words. Kurzweil has many functions including text to speech, dictionaries, and highlighters that students find advantageous. Thinking Reader™ is a software program that focuses on comprehension. eText and audio books are other commonly used AT devices for reading. Low technology solutions include different colored highlighters, sticky notes, and removable highlighter tape, which help to call attention to certain passages or pages. Book holders are also another

potentially beneficial idea. (Dell, 2008, p.60-80).

When it comes to math difficulties, troubles memorizing basic facts, inconsistent calculations, organizing problems, connecting concrete to abstract ideas, and understanding the math language are some of the most common challenges. Students may not pay attention to the operational signs or may not follow sequences. Some students count on their fingers, which can make their work tedious. (Garnett, 1998).

There are some low technology and high technology AT solutions for math difficulties. Low technology solutions include the use of manipulatives, real objects, rubber stamps, laminated addition or multiplication charts (Fact Charts), large/talking calculators, coin abacus, and coin-u-lator. Some high technology solutions include several mathematics computer programs. Math Pad™ helps students with organization. FASST Math™ focuses on fluency and automaticity with math facts. Mighty Math™ builds math skills and confidence and is used with elementary students. Math Type™ has more symbols and color coding so completing math equations on the computer can be done more easily. (Dell, 2008, p. 115-121)

Some students may find school difficult because of organization or communication difficulties. Task completion, time management, and memory are three areas in particular that AT can help. Graphic organizers, sticky pens, and calendars are some low technology AT devices. Watch Minder™ is a watch for students with ADD or attention deficit hyperactivity disorder (ADHD). It is a vibrating watch and reminder system. In terms of communication, communication boards are common items used to help students express words, thoughts, feelings, and sentences. Communication boards can be hand made or electronic. Electronic devices include Pathfinder™ and DynaVox™. (Dell, 2008, p.93-4).

Another AT device that is very common and popular is the computer. Computers provide



students with an alternative way of completing assignments. They make available activities and opportunities that people without disabilities take for granted. For students who cannot write or speak intelligibly, computers allow them to show their competency. Features on the computer itself that help individuals include auto correct, auto text, highlighting, spell check, thesaurus, and grammar check. System preferences are also another area on the computer that can be adjusted to meet one's needs, especially those with visual, hearing, or fine motor disabilities. Other computer functions that can be turned on and off are sticky keys, slow keys, and mouse keys.

In addition to features on the computer, there are various adaptations that can be made to the keyboard and mouse to help individuals use the computer. For example, with keyboards, one can find labels to place on the keys. This allows for individuals with visual or cognitive impairments or attention issues to find the keys easier. Also, one can put a keyguard on top of the keyboard to increase typing accuracy. There are moisture guards that are also placed over the keyboard to protect the keyboard from spills or drool. Not only are there items that can be placed on the keyboard to assist students, but also there are a variety of keyboards that can be used. Touch screens, expanded keyboard (enlarged or oversized), mini-keyboards, one-handed keyboards, customizable, and on screen keyboards are just a few of the alternatives. Finally, one can also find different mice to use. A trackball, joysticks, touch screens, head pointing systems, and eye gaze systems are a few examples of mid-tech to high-tech mouse alternatives. As technology continues to improve, more and more alternatives and adaptations are being found. (Dell, 2008, 158-174). Assistive technology continues to be recognized as an important part of schools. There are many benefits to its use and individuals other than those with disabilities could benefit from it as well.

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Northside Middle School

To better understand how AT is used in public schools, I interviewed Anna Epperly, special education program director at Northside Middle School (NMS), in Muncie, Indiana. She mentioned that AT is limited at NMS. The AlphaSmart™ 2000s, word processors that some students use, are at least fifteen years old. She was hoping for some more AlphaSmart™ 3000s, which included a USB drive and were easier to use. Another commonly used AT device was Kurzweil. It is an optical character recognition (OCR) program that also included a scanner, which would then read aloud text. She mentioned, however, it could be very time consuming to use and was often only used for tests. NMS has FM systems for two of their students to use. It was noted that some teachers did not like using them and often the students did not want to use them either, so they were ineffective. There were two or three SmartBoards™ in the schools.

According to Mrs. Epperly, the biggest problem with AT in schools is funding. Because of budget cuts, a referendum would not pass. There was much misunderstanding about where money would come from to pay for the technology. She also mentioned that with students from lower income homes, more Title I money could be received. This seemed like an advantage, but there are certain things you cannot buy with that money and certain funds for certain interests. Basically, there were many strings attached to the money and it is hard to receive all that the school would like.

After attending a webinar over AT, I compiled a list of the most common AT devices in Indiana public schools. Some of these devices include Kurzweil™, Alpha Smart™ 3000 (portable, battery powered, word-processing keyboard), FM systems, SmartBoards™, Dynavox™, Proloquo2go™ (communication on the go for iPhones™, iPod™ touches, and

iPad™), Boardmakers™, and iPods/iPads™. Also, Kindles™, CCTV, and pulse pens (smart pens that can record sound) are used. Commonly used software programs include Dragon Naturally Speaking™, Write Out Loud™ (talking word processor), and Co:Writer™ (word prediction software). Many of these products can go home with the students thus increasing the usage and effectiveness. The teachers commenting during the webinar also gave some AT advice. They mentioned buying many batteries to always be prepared. In addition, they stressed the importance of letting go of old technology when new technology comes along. Finally, they said to listen to the parents. Many times they have pertinent information that could assist with the implementation and utilization of the AT devices.

#### Ball State University

In addition to the information from the public schools, research was conducted as to some of the AT Ball State University offered its students. Carlos Taylor operates the adaptive computer technology (ACT) lab in the Robert Bell building. He also mentioned that many of the services offered are for students and staff with AT needs, but are commonly used by students who are blind, have visual impairments, or have learning disabilities. The ACT lab has two purposes-computer adaptations and Braille. The Braille services include converting textbooks, assignments, tests, and visuals (charts and graphs) to raised lines. The ACT lab has many software programs including Dragon Speak and Kurzweil. The computers are also used to enlarge text or read aloud material. Mr. Taylor mentioned that the lab is more adapted to individual students' needs and is very accommodating.

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During 2011, research was conducted through the Ball State University Institutional Review Board (IRB). Six public high schools throughout Indiana were selected and sent a survey

via email for their staff to complete. The survey was made online using the survey creator SurveyMonkey.com and consisted of ten questions about assistive technology knowledge. The participants were given three weeks to complete the survey and then the results were analyzed.

To begin, twenty-five participants responded. Those individuals consisted of art, business, English, mathematics, physical education, science, social studies, special education, agriculture, German, Spanish, journalism, and family consumer science teachers as well as administrators and library media personnel. 48% of the participants were familiar with AT, while 20% had heard of it and 28% were not very familiar. 88% of those responding had students with IEPs in their classes. 28% of those students were reported as requiring assistive technology according to the IEPs. Participants were asked what AT is available at their schools to use. Answers varied but included computers, enlargement machines, Braille textbooks, hearing/speaking devices, spell checker audio pens, visual aids, microphones, audio books, e-readers, tape recorders, and recording devices. Seven participants responded that they did not know or were not sure of the AT available. Devices most commonly used in the classrooms included audio/visual devices, spell checkers, magnifying projector, enlarged textbooks, software, laptops, audio books, and computers. Nine individuals answered that no AT was used in their classroom.

When asked if AT was made available to all students in the classroom, including those without IEPs, 62.5% responded no. Of the 37.5% that responded yes, many mentioned that equipment is available for all students to use. One participant said that the classroom has an audio/visual system, which is frequently used, and another said that they try to provide whatever a given student needs. Participants were also asked if there was a form of AT that they would like for their classrooms, but did not have. Thirteen percent responded yes. One participant

wanted more of everything, one mentioned software that is being downloaded soon, and another said there was technology he wanted but did not think it would qualify as AT. Finally, when asked if familiar with the Promoting Achievement through Technology and Instruction for all Students (PATINS) Project, 4.2% replied that they were familiar with it. That left 95.8% who did not know much about it.

The survey served its purpose of understanding AT devices some teachers across Indiana are using currently. It was also very informative in showing what the teachers knew about AT and PATINS.

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More research, legislation, and constant technological advances continue to enhance the field of assistive technology. With only twenty-four years of mandated legislation, AT is still gaining recognition and awareness. As the survey indicated, there are still some teachers who are not sure what AT is or how to implement it in their classroom. Nonetheless, it is important for all to remember and inform others of the impact that AT can have in an individual's life. This paper focused primarily on the academic uses of AT, though there are many other ways AT can be helpful. For students like Eli, AT was the difference between failing and showing his intelligence and academic competency. AT has the potential to empower individuals to communicate, play, work, and be independent!

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